ments, but at the same time in this, as in so many other cases, we hold that statistical methods cannot be safely used without proper training. Experiments of a most laborious character may be rendered nugatory because the observer has not started with a clear conception of what statistical processes he is going to employ to deduce his results, nor what observations are needful if any conclusions at all are to be reached by legitimate numerical arguments. The book shows the increasing interest in the problems of inheritance and in biometric methods; it is characterised throughout by a courtesy of tone which is very pleasing when contrasted with some recent controversial papers on heredity; but it fails, and fails badly, to prove any definite point, because the author has not clearly stated his problem, and had he done so has really not the knowledge needful to deal effectively with statistical data.

OUR BOOK SHELF.

Die europäischen Laubmoose. By George Roth. Lieferung i. Band i. Pp. 128. (Leipzig: Wilhelm Engelmann, 1903.)

THE second enlarged edition of Schimper's "Synopsis muscorum Europæorum" was published in 1876, and a list of European mosses was given by the same bryologist in "Revue bryologique" seven years later. Since that time, in this country there have appeared Hobkirk's synopsis, Braithwaite's "Moss-flora," and Dixon's handbook. In other countries there has been the same advance in bryological records, to mention only Limpricht's compilation for Germany, Austria, and Switzerland, and Husnot's "Muscologia gallica," so that the time is ripe for a new European synopsis. The work undertaken by Dr. Roth is, on the one hand, rendered easier by the existence of these authentic catalogues, but meantime the number of recorded species has increased, so that whereas Schimper enumerates 900, the author estimates European species, exclusive of Sphagna, at 1300; of these about 600 occur in Britain.

The greater portion of this, the first part, is given up to a general introduction, and only the last few pages are concerned with the enumeration of genera and species. The introduction is well written, and the author has throughout emphasised the various characters which are of immediate importance for identification and classification. There is an original chapter on the part which mosses play in the economy of nature, and some account of their distribution. The system of classification adopted by the author is nearly identical with that of Schimper and Limpricht, the critical features being the separation of Archidium as a special order, and the division of the Bryineæ into cleistocarpous and stegocarpous groups; British bryologists favour Lindberg's arrangement, in which the cleistocarpous mosses are split up amongst the other natural orders.

In the essential systematic part of the book there are only a few descriptions from which to form an opinion. The author leads off with the Andreæaceæ, as the Sphagnaceæ will not be included, and he makes fifteen species for Andreæa; of these several are only accorded the rank of varieties by other authorities, *e.g.* of the fifteen, nine have been found in Britain, and yet Dixon only allows at the most five species. The various countries from which the species have been recorded should, we think, be definitely stated. Another very desirable, indeed necessary, addition is the provision of tables to determine genera, and a separate species-key to each genus. The book is liberally illustrated, but the plates are far from pleasing, and the areolation of the leaves is very doubtfully shown owing to the small scale adopted for the drawings. There are obvious advantages in using a general synopsis rather than, or in addition to, the flora of a single country, so that the book is a very desirable one, but it would be made more useful by the insertion of analytical keys and critical notes dealing with the more doubtful species. The book is to be issued in eight parts at a cost of about three pounds.

Mechanics, Molecular Physics and Heat. By Robert Andrews Millikan, Ph.D. Pp. 242; diagrams. (Boston and London: Ginn and Co., 1903.) Price 7*s*.

THIS book represents the first portion of a college course in general physics, in which the primary object has been to establish an immediate and vital connection between theory and experiment. It has, therefore, been made neither a laboratory manual, in the ordinary sense of the term, nor yet a simple class-room text. Each section is introduced by a theoretic statement, and is followed by instructions with regard to an experiment to be performed. As it is only a twelve weeks' course which is represented, the experiments have had to be selected out of the large number of possible ones, and in making this selection the author has aimed at having one, and only one, experiment in illustration of each principle.

For example, there is but one general principle involved in the method of mixtures, whether it be applied to the determination of the specific heat of a solid or of a liquid, the latent heat of fusion or of vaporisation; hence only one laboratory exercise is provided in illustration of the method. This extreme pruning may sometimes be necessary in an introductory course, and where circumstances render it necessary the plan of the author is no doubt excellent. But we feel sure that such an abridgment is not to be desired. A student learns so much in finding out the variations in a method which are necessary to apply it effectively to different purposes that every opportunity for the discovery ought to be afforded.

The description of the selected experiments is excellently, if somewhat briefly, made. About half the book is devoted to mechanics, which in England is usually taken in a separate course. Each chapter is concluded with a few problems having considerable merit.

We have only to suggest that in the discussion of rotation it should be clearly brought out that the moment of the forces *must* be taken either with regard to the centre of mass or to an axis fixed in space, and further that the moment of inertia is not necessarily the same in the two cases.

Ostwald's Klassiker der exakten Wissenschaften. (Leipzig: Wilhelm Engelmann; London: Williams and Norgate, 1903.)

SEVERAL additions to Prof. Ostwald's important series of reprints of classical papers lie before us. We have space to do little more than mention the titles of the individual volumes, but, in general, we cannot forbear expressing pleasure at the increased facilities they afford for a student to become familiar with original papers connected with the exact sciences. Of course, to the English student, translations into English would be more acceptable. But, given a sufficient knowledge of German, the handiness of these volumes and the valuable annotations of the respective editors are sure to prove a great attraction.

The following are brief particulars:—

No. 135.—"Theorie der Gestalt von Flussigkeiten

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im Zustand des Gleichgewichts." Gauss. Translated by R. H. Weber. Edited by H. Weber. (Pp. 73, price 1.20 marks.)

No. 138.—"Über die Bewegung der Körper durch den Stoss. Uber die Centrifugalkraft." C. Huygens. Edited by F. Hausdorff. (Pp. 79, price 1.40 marks.)

No. 20.—"Abhandlung über das Licht." C. Huygens. Second Edition. Revised by A. von Oettingen. This is a translation of the famous essay in which the wave theory of light was developed and the peculiar refraction of Iceland spar was investigated. (Pp. 115, price 2.00 marks.)

No. 134.—"Experimental-Untersuchungen über Electricität." Faraday. Edited by von Oettingen. Sixteenth and seventeenth series, in which the source of the E.M.F. of a voltaic cell is investigated. (Pp. 103, price 1.60 marks.)

No. 136.—Ditto. Eighteenth and nineteenth series, describing his investigations on the development of electricity by the friction of water and vapour in other bodies, and on the relations of magnetism and light. (Pp. 58, price 1.20 marks.)

No. 21.—"Über die Wanderungen der Ionen während der Elektrolyse." Hittorf. First Part. Edited by Ostwald. Second Edition. (Pp. 115, price 1.60 marks.)

No. 137.—"Abhandlungen zur Thermodynamik chemischer Vorgänge" (1869–1881). Horstmann. Edited by van 't Hoff. (Pp. 72, price 1.20 marks.)

No. 139.—"Thermodynamische Abhandlungen über Moleculartheorie und chemische Gleichgewichte" (1867–1872). C. M. Guldberg. Translated and edited by R. Abegg. (Pp. 85, price 1.50 marks.)

The last three numbers represent treatises which are familiar by quotation to all students of physical chemistry, and ought to be welcomed in this new form.

Principii di Stereodinamica. By Gian Antonio Maggi, Professor at Pisa. Pp. 264. (Milan: Ulrico Hoepli, 1903.)

Starting with the formulæ connecting the coordinates of a particle of a rigid body referred to axes fixed in space with its coordinates referred to axes fixed in the body, the equations of motion of a rigid body moving in three dimensions are deduced from D'Alembert's theorem. The applications include the problems of motion under no forces, in which the equations are integrated by elliptic functions, the simple and compound pendulum, motion of a billiard ball, &c., and Lagrange's equations are also treated in this part. The second part deals with Hamilton's principle in its various forms, and the third with Jacobi's theorem. The work differs in many respects from the conventional English text-books, in which special attention is given to the properties of moments of inertia and numerical examples rather than to rigorous deductions of the fundamental equations. Those whose lot it is to lecture on "three dimensional rigid" will find a study of this book very useful and suggestive. G. H. B.

The Fields of France. Little Essays in Descriptive Sociology. By Madame Mary Duclaux (A. Mary F. Robinson). Pp. vii + 318. (London: Chapman and Hall, Ltd., 1903.) Price 5*s.* net.

This little book reveals the writer's love for rural France, and her anxiety "to set down chiefly the things I have seen for myself, or which have come under my own knowledge" (p. 13), is reflected in the reality of the descriptions and in their sustained interest. Though there is little of an exciting character in the pages, readers who value word pictures of the habits and customs of country folk will find pleasure in this book.

LETTERS TO THE EDITOR.

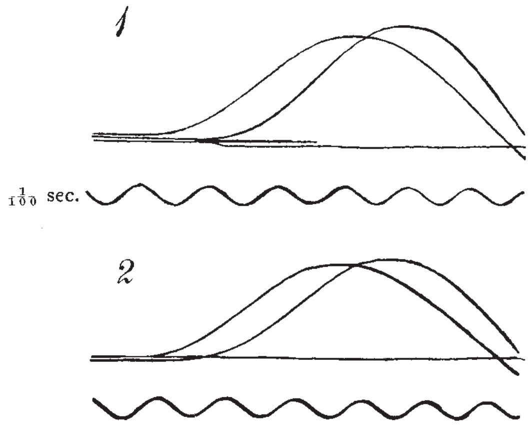
[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of Nature. *No notice is taken of anonymous communications.]*

The Velocity of a Nervous Impulse.

Sir W. Gowers's dilemma (p. 105) is of the library rather than of the laboratory, and I should hardly care to appeal to differing book-data by different observers in evidence of an acceleration of nervous processes during the last fifteen years, either in the same or in different individuals.

I happen to possess records taken on myself in 1882 and in 1903, as well as upon my son, *aet.* fifteen, in May, 1903. In all three cases the velocity comes out at about 50 metres per second, as I read the records, but can easily be taken as indicating 60 metres if the rise of each curve from the base line is spotted a little differently. It is, in fact, advisable to examine the original data very closely before quoting velocities deduced from them, since very small differences in measurement along the abscissa multiply out to large differences of velocity expressed in metres per second.

Thus in the instances enclosed, taken from my son last May in an interregnum from Greek roots, the times, as I read them, are 0·0063 and 0·0053 sec., and the velocities 51·5 and 61·75 metres per second.



May 3, 1903.—W. W. Waller, *aet.* 15; nerve-transmission velocity; excitation above clavicle and at bend of elbow; distance = 0·325 metre. Time-diff. 1, 0·0063 sec.; 2, 0·0053 sec. Velocity 1, 53 metres per sec. 2, 62 metres per sec.

The more carefully the records are taken and read the less inaccurately do the velocities come out. I think that Dr. Alcock's estimate of 66 metres per second is a somewhat closer approximation to the truth than my estimate of 50 metres, and *a fortiori* than the still lower estimate of 33·9 metres, which is that originally made by Helmholtz and Baxt in 1867. A. D. Waller.

A Useful Empirical Formula.

The very neat construction given by Prof. Perry in Nature, December 3, p. 102, leads at once to the equation

$$\frac{\Delta y}{y-a}=\frac{\tan\beta}{\tan\alpha}\,\frac{\Delta x}{x};$$

and the assumed equation $y-a=bx^n$ gives $\frac{dy}{y-a}=n\frac{dx}{x}$

Hence, approximately, $n=\frac{\tan\beta}{\tan\alpha}$.

Why does Prof. Perry prefer to write

$$n=\frac{\log(1+\tan\beta)}{\log(1+\tan\alpha)},$$

which is less simple for computation?

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